



INVITATION FOR BIDS

OFFICE OF PROCUREMENT & CONTRACTS

1. INSTRUCTIONS FOR BIDDERS

- a. Sealed bids will be received in the Office of Procurement & Contracts, Mississippi State University, for the purchase of the items listed herein.
- b. All bids must be received in the Office of Procurement & Contracts on or before the bid opening time and date listed herein. Delivery of bids must be during normal working hours, 8:00 a.m. to 5:00 p.m. CST, except on weekends and holidays when no delivery is possible.
- c. Bidders shall submit their bids either electronically or in a sealed envelope.
 - i. Sealed bids should include the bid number on the face of the envelope as well as the bidders' name and address. Bids should be mailed to: 245 Barr Avenue, 610 McArthur Hall, Mississippi State, MS 39762.
 - ii. At this time we only accept non-ITS bids electronically. For electronic submission of bids, go to: <https://portal.magic.ms.gov> and use the RFX number on the next page as your reference number.
- d. All questions regarding this bid should be directed to the Office of Procurement & Contracts at 662-325-2550.

2. TERMS AND CONDITIONS

- a. All bids should be bid "FOB Destination"
- b. Bidders must comply with all rules, regulations, and statutes relating to purchasing in the State of Mississippi, in addition to the requirements on this form. General Bid Terms and Conditions can be found here:
https://www.procurement.msstate.edu/procurement/bids/Bid_General_Terms_May_2019_V2.pdf
- c. Any contract resulting from this Invitation for Bid shall be in substantial compliance with Mississippi State University's Standard Contract Addendum:
<https://www.procurement.msstate.edu/contracts/standardaddendum.pdf>

Bid Number/RFX Number: 23-36/RFX#3160005736

Opening Date: March 28, 2023 @2:00 p.m.

**Description: Generator for New Kinesiology & Autism Facility
(Material Only)**

Vendor Name: _____

Vendor Address: _____

Telephone Number: _____

Days the Offer is Firm: _____

Authorized Signature: _____

Name: _____

Title: _____

See following pages for specifications and bid pricing form.

**Specifications & Materialman's Proposal
For
Generator for
New Kinesiology & Autism Facility
(Material Only)**



2 March 2023

Prepared for:
Mississippi State University
610 McArthur Hall
Mississippi State, Mississippi 39762



Prepared by:
Corbett Legge & Associates, PLLC
431 West Main Street, Suite 101
Tupelo, MS 38804

WR# 458108
CLA# 21093

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GENERATOR FOR
NEW KINESIOLOGY & AUTISM FACILITY (MATERIAL ONLY)
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI

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INSTRUCTIONS TO BIDDERS

GENERATOR FOR
NEW KINESIOLOGY & AUTISM FACILITY (MATERIAL ONLY)
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI

Refer to Bid Advertisement for bid opening time and date.

SUBMITTAL OF SEALED PROPOSALS: Bids that are sent by mail shall be clearly marked "Bid Enclosed" or "Bid Envelope Enclosed" as appropriate. The sealed envelope containing the bid shall have the following information shown on the envelope:

BID ENCLOSED
ITEM: GENERATOR FOR
NEW KINESIOLOGY & AUTISM FACILITY (MATERIAL ONLY)
OWNER: MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI
BIDDER: BIDDER'S ADDRESS
BID DUE: REFER TO ADVERTISEMENT FOR BIDS

Bids that are sent by parcel delivery service should be addressed to:

Mr. Don Buffum, Director
Office of Procurements & Contracts
Mississippi State University
245 Barr Avenue, 610 McArthur Hall
Mississippi State, Mississippi 39762

Bids that are sent by mail should be addressed to:

Mr. Don Buffum, Director
Office of Procurements & Contracts
Mississippi State University
P.O. Box 5307
Mississippi State, Mississippi 39762

SUBMITTAL OF ELECTRONIC BIDS: Each electronically submitted bid must be submitted in "pdf" format and shall contain the same information and forms as required for the paper bids. In the event that an electronically submitted bid has a corrupted attachment, the bid will be considered null and void.

The Engineer for this project is:

Corbett Legge & Associates, PLLC
431 West Main Street, Suite 101
Tupelo, MS 38804
Telephone 662.844.7114

The Engineer will represent the Owner in all matters pertaining to this project, including but not limited to, answering technical questions of prospective bidders and recommendations of lowest and best bid, acceptance of shop drawings and similar documents, and approval of invoices prior to payment by the Owner.

Questions and Clarifications:

Submit all questions about the specifications to the Engineer, in writing. Replies will be issued to all prospective Bidders of Record. The Owner will be responsible for oral clarifications. Reference the bid number in all correspondence.

Bid Preparation Instructions:

Bidders shall complete all blank spaces on the Materialman's Proposal Form for each item of equipment being bid in accordance with these specifications and terms and conditions.

Bidder shall insert the delivery time in weeks after receipt of an order for each item of equipment bid in the blank provided. Bidder shall also indicate equipment being bid by the manufacturer's name and catalog number in the blanks provided on the Materialman's Proposal Form.

Bidder shall complete both copies of the Materialman's Proposal Forms bound in these Specifications and shall submit both copies to the OWNER at the time that the bids are due. Bidders taking exceptions to any part of the specifications, conditions, or payment terms specified herein shall show such exception on the Materialman's Proposal Form in the space provided. If exceptions are not shown on the Proposal Form, Bidder must supply equipment specified herein under the terms and conditions specified herein. Proposals that are modified, excepted, or in any way changed from the proposal that the OWNER is requesting in this request for proposals may be rejected by the OWNER.

PROPOSAL FORM

GENERATOR FOR
NEW KINESIOLOGY & AUTISM FACILITY (MATERIAL ONLY)
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI

To: Mr. Don Buffum, Director
Office of Procurements & Contracts
Mississippi State University
Barr Avenue, 610 McArthur Hall
Mississippi State, Mississippi 39762

The undersigned (hereinafter called the MATERIALMAN) acknowledges by his signature that he has received and examined the documents entitled "Specifications and Materialman's Proposal for "GENERATOR FOR NEW KINESIOLOGY & AUTISM FACILITY (MATERIAL ONLY)" for Mississippi State University, dated March 2, 2023, and has included the provisions of the Specifications in his Proposal. The MATERIALMAN further acknowledges that he has received the following addenda:

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

The Materialman hereby proposes to sell and deliver to Mississippi State University, Mississippi State, Mississippi (hereinafter called OWNER), upon the terms and conditions herein stated, the equipment specified in the attached specification for the following sums:

| <u>BID ITEM</u> <u>NUMBER</u> | <u>DESCRIPTION</u> | <u>NO.</u> <u>REQUIRED</u> | <u>UNIT</u> | <u>TOTAL</u> <u>PRICE</u> |
|----------------------------------|---------------------------------|-------------------------------|-------------|------------------------------|
| 1 | Generator and Transfer Switches | 1 | LS | _____ |

- A. The prices set forth above shall include delivery to the Mississippi State University Oktibbeha County; Starkville, Mississippi. The exact location on campus will be determined at a later date and will be provided by the Engineer. The equipment will be received and unloaded by a contractor on campus.
- B. Mississippi State University is tax exempt. The prices set forth herein do not include any sums which are or which may be payable by the Materialman on account of taxes imposed by any taxing authority upon the sale, purchase, or use of the equipment.

- C. The prices set forth above shall be firm if accepted within thirty (30) days of the bid due date and time.
- D. The MATERIALMAN shall include engineering data with his proposal as specified and as required to evaluate bid.
- E. The times of delivery shall be as follows:

BID ITEM NO. 1 _____

- F. The items included in each of the above bid prices are as follows:

BID ITEM NO. 1

MANUFACTURER _____

CATALOG NO. _____

- G. Title of the equipment shall pass to the Owner upon:

1. Delivery to location specified.
2. Satisfactory inspection for in-transit damage.
3. Acceptance by the Owner.

- H. Bidder hereby certifies that he is:

() Manufacturer

() Manufacturer's Authorized Mississippi Representative

() Manufacturer's Authorized Mississippi Distributor

- I. Exceptions: _____

- J. It is understood by the undersigned that the OWNER retains the privilege of accepting or rejecting all or any part of this proposal and to waive any informalities or technicalities therein. Counter-proposals or qualified bids shall be subject to rejection at the discretion of the OWNER.

It is also understood by the undersigned that the OWNER reserves the right to conduct investigations to evaluate the proposals received and to award the bid for this equipment to the lowest Bidder, who in the OWNER's evaluation will provide the equipment which will be in the best interest of the OWNER.

MATERIALMAN

BY: _____

TITLE: _____

ADDRESS: _____

TELEPHONE NO.: _____

DATE SIGNED: _____

SECTION 26 32 13 - PACKAGED ENGINE GENERATOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Engine.
2. Natural Gas fuel system.
3. Control and monitoring.
4. Generator overcurrent and fault protection.
5. Generator, exciter, and voltage regulator.
6. Load bank for testing.
7. Outdoor generator-set enclosure.
8. Vibration isolation devices.

- B. Related Requirements:

1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

- A. NG: Natural Gas
- B. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in cubic feet per hour at 0.8 power factor at 1.0 times generator capacity.

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5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include air flow requirements for cooling and combustion air in cfm at 0.8 power factor, with air supply temperature of 95 deg F (35 deg C), 80 deg F (27 deg C), 70 deg F (21 deg C), and 50 deg F (10 deg C). Provide drawings showing requirements and limitations for location of air intake and exhausts.
7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

C. Source Quality-Control Reports: Including, but not limited to, the following:

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
5. Report of sound generation.
6. Report of exhaust emissions showing compliance with applicable regulations.

D. Field quality-control reports.

E. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For engine generators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

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- a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
- b. Operating instructions laminated and mounted adjacent to generator location.
- c. Training plan.

1.6 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
 2. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
 3. Tools: Each tool listed by part number in operations and maintenance manual.

1.7 QUALITY ASSURANCE

- A. Qualifications: Manufacturer's authorized representative who is trained and approved for installation and service of units required for this Project.
 1. Maintenance Proximity: Not more than two hours normal travel time from Installer's place of business to Project site.
 2. Engineering Responsibility: Preparation of data for vibration isolators including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with ASME B15.1.
- D. Comply with NFPA 37.
- E. Comply with NFPA 70.
- F. Comply with NFPA 110 requirements for Level 1 emergency power supply system.
- G. Comply with UL 2200.
- H. Engine Exhaust Emissions: Comply with applicable state and local government requirements.
- I. Noise Emission: Comply with all applicable state and local government requirements and shall have a maximum dBA level of 76 at 23 feet. Noise levels are due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: Minus 15 to plus 100 deg F.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. **Warranty Period: 5 years from date of Startup or 2500 hours (whichever comes first)**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. Caterpillar; Engine Div.
 - 2. Generac Power Systems, Inc.
 - 3. Kohler Co.; Generator Division.
 - 4. Onan/Cummins Power Generation; Industrial Business Group.
- B. Source Limitations: Obtain packaged engine generators and auxiliary components through one source from a single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. B11 Compliance: Comply with B11.19.
- B. NFPA Compliance:
 - 1. Comply with NFPA 37.
 - 2. Comply with NFPA 70.
 - 3. Comply with NFPA 110 requirements for Level 1 EPSS.
- C. UL Compliance: Comply with UL 2200.
- D. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: Minus 15 to plus 100 deg F.

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and use.
- C. Power Rating: Standby
- D. EPSS Class: Engine generator shall be classified as Class 96 according to NFPA 110.
- E. Service Load: 350kW / 465skVA / 437.5kVA
- F. Power Factor: 0.8, lagging.
- G. Frequency: 60 Hz.
- H. Voltage: 480V AC.
- I. Phase: Three-phase, four-wire, wye.
- J. Governor: Adjustable isochronous, with speed sensing.
- K. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
- L. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
 - 2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- M. Engine Generator Performance:
 - 1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
 - 2. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
 - 3. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
 - 4. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
 - 5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.

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6. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
7. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
8. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
9. Start Time:
 - a. Comply with NFPA 110, Type 10 system requirements.

2.4 GAS ENGINE

- A. Fuel: Natural gas.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: Engine or skid-mounted.
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499 and with NFPA 110 requirements for Level 1 equipment for heater capacity.
- E. Integral Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.
 1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

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- a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and non-collapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Muffler/Silencer:
- 1. Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - a. Minimum sound attenuation of 25 dB at 500 Hz.
 - b. Sound level measured at a distance of 23 feet from exhaust discharge after installation is complete shall be **76** dBA or less.
- G. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- H. Starting System: 12-V electric, with negative ground.
- 1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
 - 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 - 1. Cranking Cycle: As required by NFPA 110 for system level specified.
 - 2. Battery: Adequate with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.
 - 3. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
 - 4. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F (10 deg C) regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
 - 5. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35 A minimum continuous rating.
 - 6. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg F (minus 40

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- deg C) to 140 deg F (plus 60 deg C) to prevent overcharging at high temperatures and undercharging at low temperatures.
- c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.5 GENERATOR SIZING CONSIDERATIONS

- A. Generator shall have sufficient capacity to allow normal starting and running of the fire pump (15% maximum voltage drop) while supplying all other simultaneously operated loads. It shall be acceptable to consider the load shedding the Standby Loads ATS.
- B. It is acceptable for the generator manufacturer to provide an oversized alternator as required for starting.

2.6 GAS FUEL SYSTEM

- A. Natural Gas Piping: Comply with requirements in Section 231123 "Facility Natural Gas Piping."
- B. Gas Train: Comply with NFPA 37.
- C. Engine Fuel System:
- D. Natural Gas, Vapor-Withdrawal System:
 - 1. Carburetor.
 - 2. Secondary Gas Regulators.
 - 3. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valves.
 - 4. Fuel Filters.
 - 5. Manual Fuel Shutoff Valves.
 - 6. Flexible Fuel Connectors.

2.7 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates generator-set shutdown.

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When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.

B. Comply with UL 508A.

C. Configuration:

1. Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from generator-set vibration. Panel shall be powered from the engine generator battery.

D. Control and Monitoring Panel:

1. Digital controller with integrated LCD, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
2. Instruments: Located on the control and monitoring panel and viewable during operation.
 - a. Engine lubricating-oil pressure gage.
 - b. Engine-coolant temperature gage.
 - c. DC voltmeter (alternator battery charging).
 - d. Running-time meter.
 - e. AC voltmeter.
 - f. AC ammeter.
 - g. AC frequency meter.
 - h. Generator-voltage adjusting rheostat.
3. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm indication, including the following:
 - a. Cranking control equipment.
 - b. Run-Off-Auto switch.
 - c. Overcrank alarm.
 - d. Overcrank shutdown device.
 - e. Low water temperature alarm.
 - f. High engine temperature prealarm.
 - g. High engine temperature.
 - h. High engine temperature shutdown device.
 - i. Overspeed alarm.
 - j. Overspeed shutdown device.
 - k. Coolant low-level alarm.
 - l. Coolant low-level shutdown device.
 - m. Battery high-voltage alarm.
 - n. Low cranking voltage alarm.
 - o. Battery-charger malfunction alarm.
 - p. Battery low-voltage alarm.

E. Connection to Datalink:

1. A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication.
 2. Provide connections for datalink transmission of indications to remote data terminals via Ethernet.
- F. Common Remote Panel with Common Audible Alarm: Include necessary contacts and terminals in control and monitoring panel. Remote panel shall be powered from the engine generator battery.
- G. Remote Alarm Annunciator: An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.
1. Overcrank alarm.
 2. Coolant low-temperature alarm.
 3. High engine temperature pre-alarm.
 4. High engine temperature alarm.
 5. Low lube oil pressure alarm.
 6. Overspeed alarm.
 7. Low coolant level alarm.
 8. Low cranking voltage alarm.
 9. Contacts for local and remote common alarm.
 10. Audible-alarm silencing switch.
 11. Air shutdown damper when used.
 12. Run-Off-Auto switch.
 13. Low cranking voltage alarm.
- H. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation. Verify location of switch with Engineer.
- I. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

2.8 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Overcurrent protective devices shall be coordinated to optimize selective tripping when a short circuit occurs.
1. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.
 2. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.

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B. Generator Overcurrent Protective Device;

1. Molded-case circuit breaker, electronic-trip type; 100 percent rated; complying with UL 489:
 - a. Tripping Characteristics: As described herein.
 - b. Trip Settings: Selected to coordinate with generator thermal damage curve.
 - c. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
 - d. Mounting: Adjacent to or integrated with control and monitoring panel.
2. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms. Contacts shall be available for load shed functions.
3. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
4. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
5. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

C. Provide the following breakers to support the loads as noted:

1. Provide (1) 225A/3P breaker for the building Emergency Loads.
2. Provide (1) 400A/3P breaker for the building Standby Loads.
3. Provide (1) 300A/3P breaker for the building Fire Pump.
4. All breakers shall have ST, STD, LT, LTD, and Instantaneous Adjustable Trip Settings and Ground Fault Sensing Only (no tripping).

2.9 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Range: Provide broad range of output voltage by adjusting the excitation level.
- D. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- E. Enclosure: Dripproof.
- F. Instrument Transformers: Mounted within generator enclosure.
- G. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

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1. Adjusting Digital Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
2. Maintain voltage within 20 percent on one step, full load.
3. Provide anti-hunt provision to stabilize voltage.
4. Maintain frequency within 15 percent and stabilize at rated frequency within 5 seconds.

- H. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

2.10 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description:

1. Vandal-resistant, sound-attenuating, weatherproof steel housing, wind resistant up to 100 mph (160 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

- a. Sound Attenuation Level: Level II with dBA levels as described herein.

- B. Hinged Doors: With padlocking provisions.

- C. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.

- D. Muffler Location: Within enclosure.

- E. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.

1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.

- F. Interior Lights with Switch: Factory-wired, LED (30 fc average maintained), vapor-proof fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.

1. Lighting system and connection point for operation when remote source is available.

- G. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.

2.11 VIBRATION ISOLATION DEVICES

- A. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 - 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch-(6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - 2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
- B. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.12 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer shall provide cost in their bid for the following finishes that will be selected by the ARCHITECT. Provide a color chart with your submittals so he can select. Finish shall be applied over corrosion-resistant pretreatment and compatible primer. Coordinate exact finish with Architect.
- B. FINISHES THAT MUST BE AVAILABLE:
 - 1. Yellow
 - 2. Green
 - 3. Beige
 - 4. Grey
 - 5. White
 - 6. **DO NOT BID THIS PROJECT IF YOU CAN'T PROVIDE THESE COLORS AS PART OF YOUR BID. NO CHANGE ORDER WILL BE ISSUED FOR THESE COLORS.**

2.13 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 - 1. Tests: Comply with IEEE 115 and with NFPA 110, Level 1 Energy Converters.

- B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
 2. Test generator, exciter, and voltage regulator as a unit.
 3. Full load run.
 4. Maximum power.
 5. Voltage regulation.
 6. Transient and steady-state governing.
 7. Single-step load pickup.
 8. Safety shutdown.
 9. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
 10. Report factory test results within 10 days of completion of test.

PART 3 - EXECUTION – Not Applicable

END OF SECTION 26 32 13

SECTION 26 36 00 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes transfer switches rated 600 V and less, including the following:
 - 1. Automatic transfer switches.
 - 2. Provide (1) 225A/3P four-pole Automatic Transfer Switch with 50kAIC withstand rating for Emergency Loads.
 - 3. Provide (1) 400A/3P four-pole Automatic Transfer Switch with 50kAIC withstand rating for Standby Loads.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
 - 1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch.
- C. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
 - 1. Features and operating sequences, both automatic and manual.
 - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

- B. Source Limitations: Obtain automatic transfer switches, non-automatic transfer switches and remote annunciators through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NEMA ICS 1.
- E. Comply with NFPA 70.
- F. Comply with NFPA 110.
- G. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two year from date of startup.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Contactor Transfer Switches:
 - a. Cutler Hammer ATC3 series switch or approved equal
 - b. Caterpillar; Engine Div.
 - c. Emerson; ASCO Power Technologies, LP.
 - d. Kohler Power Systems; Generator Division.
 - e. Onan/Cummins Power Generation; Industrial Business Group.
 - f. Or Equal
 - 2. Transfer Switches Using Molded-Case Switches or Circuit Breakers are NOT allowed.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 - 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
- C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- E. Electrical Operation: Accomplish by a non-fused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
 - 2. Switch Action: Double throw; mechanically held in both directions.
 - 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- G. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 26 Section "Basic Electrical Materials and Methods."
 - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- H. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 1 equipment according to NFPA 110.

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- B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
- C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for automatic operation. Control circuit automatically disconnects from electrical operator during manual operation.
- D. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
- E. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.
- F. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
- G. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.
- H. Automatic Closed-Transition Transfer Switches: Include the following functions and characteristics:
 - 1. Fully automatic make-before-break operation.
 - 2. Load transfer without interruption, through momentary interconnection of both power sources not exceeding 100 ms.
 - 3. Initiation of No-Interruption Transfer: Controlled by in-phase monitor and sensors confirming both sources are present and acceptable.
 - a. Initiation occurs without active control of generator.
 - b. Controls ensure that closed-transition load transfer closure occurs only when the 2 sources are within plus or minus 5 electrical degrees maximum, and plus or minus 5 percent maximum voltage difference.
 - 4. Failure of power source serving load initiates automatic break-before-make transfer.
- I. Automatic Transfer-Switch Features:
 - 1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
 - 2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
 - 3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

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4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
9. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
10. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
11. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - b. Push-button programming control with digital display of settings.
 - c. Integral battery operation of time switch when normal control power is not available.

2.4 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION – Not Applicable

END OF SECTION 26 36 00